CLAIMS

What is claimed is:

1. A memory device comprising:

a backplane lying upon a substrate;

an metal sulfide based media overlying the backplane, the metal sulfide based media comprising an array of selectively conductive memory cells; and

a microactuator assembly operative to move a plurality of probes over the memory cells to facilitate reading, writing, and erasing of selected cells.

2. The memory device of claim 1, further comprising MEMS control circuitry fabricated on the substrate.

3. The memory device of claim 1, wherein the probes are graphite

4. The memory device of claim 1, wherein the media is used in conjunction with a polymer.

5. The memory device of claim 4, wherein the polymer is selected from one of the group consisting of polyacetylene, polyparaphenylene, polythiophene, polypryrrole, and polyaniline, polyphenylacetylene, polydiphenylacetylene.

6. The memory device of claim 1, wherein the probes are scanning tunneling microscopic probes.

7. The memory device of claim 6, wherein the probes are operated at a constant distance away from the memory cell.

8. The memory device of claim 7, wherein the distance between the probe and the memory cell is maintained constant by employing a feedback loop and a microactuated cantilever.

9. The memory device of claim 1, wherein the probes are in contact the surface of the memory media.

10. A memory device comprising:

a metal sulfide based memory media;

an array of probes operative to read, write, and erase the memory media; and

controllers for each probe used for formatting the memory media and guiding the motion of the probes.

11. The memory device of claim 10, wherein the memory media comprises a plurality of metal sulfide based memory cells.

12. The memory device of claim 11, wherein each memory cell has a large range of conductivity states at each distinguishable memory cell site.

13. The memory device of claim 12, wherein each distinguishable memory cell site is determined by size and motion of the probes.

14. A memory device comprising:

a substrate;

a metal sulfide based polymer layer;

a backplane lying between the polymer layer and the substrate;

at least one probe facilitating testing the state of the polymer layer; and

a MEMS actuator operative to move the at least one probe over the polymer layer.

15. A method for retrieving cell state values, comprising:

positioning probes over selected metal sulfide based memory cells;

applying a fixed voltage across a subset of the cells; and

determining the impedance of the subset of cells.

16. The method of claim 15, wherein the cell impedance is determined by analyzing tunnel current between the probe and the memory cell.

17. The method of claim 15, further comprising comparing the measured impedance value with available impedance states to determine the logical state of multiple bits of information contained within the cell.

18. A method for programming cell state values, comprising:

positioning microactuated probes over selected metal sulfide based memory cells;

determining a desired impedance state; and

applying a threshold voltage across the memory cell corresponding to the desired impedance state.

19. A method of erasing memory cell state values, comprising:

positioning probes over selected metal sulfide based memory cells; and

applying a voltage equal and opposite the programming voltage across the memory cell.

20. A method of erasing memory cell state values comprising:

positioning probes over selected metal sulfide based memory cells;

measuring the impedance state of the selected memory cells;

determining an impedance state of the memory cells with selected bits erased; and

applying a threshold voltage to the memory cells such that the resulting cell impedance corresponds to the impedance state of the cell with the selective bits erased.

21. A memory device comprising:

a metal sulfide based memory media;

means for at least one of reading, writing, and erasing the memory media; and

means for formatting the memory media.